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Original Article

Ear, Nose and Throat Section

# Study of Myringoplasty in Wet and Dry Ears in Mucosal Type of Chronic Otitis Media

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## ABSTRACT

**Introduction:** Chronic otitis media is the most common cause of hearing impairment in the developing countries. Hearing loss can have serious effects on day to day life. Ear discharge in chronic otitis media may continue for months to years with increasing hearing impairment and also life threatening infective complications, which is more common in active and also in inactive disease form as well. Myringoplasty is an operative procedure to close the perforation in tympanic membrane.

**Aim:** To compare the success rate of graft uptake in dry and wet ears and to compare the postoperative hearing improvement in dry and wet ear following myringoplasty.

**Materials and Methods:** The comparative study was carried out on total 30 patients with chronic otitis media with central perforation. Of these 15 patients belong to dry ear group and 15 patients with wet ear group.

These selected patients on simple random basis were subjected to clinical, audiological, radiological and laboratory investigations and one day before operation, patients were admitted to the hospital and written informed consent was taken in all cases.

All patients underwent underlay technique myringoplasty. Postoperatively all patients were evaluated for graft uptake and hearing improvement by pure tone audiometry at 3rd month follow-up.

**Results:** In our study, the successful graft uptake was seen in 80% in dry ear and 73.3% in wet ear, statistically p-value ($\chi^2$=1.24) is (p>0.05) which is insignificant. Postoperatively hearing gain was (0-5 dB) in 3 patients (20%) with dry ear and 2 patients (13.5%) with wet ear; (6-10 dB), in 4 patients (26.6%) with dry ear and 6 patients (40%) with wet ear; more than 10 dB in 5 patients (33.3%) with dry ear and 3 patients (20%) with wet ear, statistically p-value is $\chi^2$=1.24 (p >0.05) which is not significant.

**Conclusion:** In this study the success rate of graft uptake and hearing improvement is found almost equal in dry and wet ear by using underlay technique of myringoplasty, also found statistically insignificant.


**Keywords:** Congestion, Discharge, Graft, Oedema, Perforation

## INTRODUCTION

Chronic otitis media is a disease of mucoperiosteal lining of the middle ear cleft. It is a disease, which can have long-term consequences and complications and hence research on chronic suppurative otitis media is important. It is the most common cause of hearing impairment in the developing countries. Hearing loss can have serious effects on day to day life. Ear discharge in chronic otitis media may continue for months to years with increasing hearing impairment and also life threatening infective complications, which is more common in active and also in inactive disease form as well. Studies show that the graft uptake and hearing improvement has significant variations in myringoplasty in dry and wet ears. The age of the patient at the time of surgery, the length of time the ear had been dry, nor the presence of the mucopus in the ear at surgery has significant bearing on success [1]. Seventeenth century - A pig's bladder was stretched across an ivory tube and placed in the ear by Benzer. In 1959 Ortegren described temporalis fascia as a graft for first time. Under surface is employed by Sea and Tubb in 1959 [2].

The rationale and need of this study is that, in most of the previous studies mentioned are related to factors like cause of perforation, age, technique of graft insertion, state of discharge and size of perforation, all these factors are individually studied. However, our study includes all these factorial effects influencing on graft uptake and hearing improvement on pre and postoperative state are dealt in chronic otitis media of mucosal type only. Hence, this study becomes unique.

## AIM

The aim of the study was to compare the success rate of graft uptake in dry and wet ears and to compare the postoperative hearing improvement in dry and wet ear following myringoplasty by underlay technique in chronic otitis media of mucosal type.

## MATERIALS AND METHODS

This study was conducted at Bapuji Hospital and Chigateri Government General Hospital which are teaching hospitals attached to JJM Medical College Davanagere, Karnataka, India.

The comparative study was carried out during the period of September 2014 to August 2015 on total 30 patients with chronic otitis media of mucosal type. Of these 15 patients belong to dry ear group and 15 patients with wet ear group.

The patients with chronic otitis media of mucosal type were diagnosed based on history taking, clinical examination and pure tone audiometry and X-ray examination of mastoids were selected on simple random basis and were included in this study on inclusion and exclusion criteria.

A predesigned proforma was used to record the relevant information such as patient's data, clinical findings, investigation reports, from the individual patient is framed and one day before operation, patients were admitted to the hospital and written informed consent was taken in all cases.

All patients underwent underlay technique myringoplasty by the same surgeons under general anaesthesia. Postoperatively all patients were evaluated for graft uptake and hearing improvement by pure tone audiometry at 3rd month follow-up.

**Inclusion Criteria:** All cases of chronic otitis media of mucosal type only, age group between 15 years to 45 years of age of patients and both the sexes, patients with small, medium, large and subtotal type of perforations, patients with mucoid or mucopurulent ear discharge as wet ear.

**Exclusion Criteria:** Total and attic perforations and squamosal type chronic otitis media, patients having chronic otitis media with complications and the revision ear surgeries.

## STATISTICAL ANALYSIS

The p-value is calculated in both, the graft uptake rate and hearing improvement, with the results of myringoplasty using chi square test.

## RESULTS

In our study, the successful graft uptake was seen in 80% in dry ear and 73.3% in wet ear, statistically p-value ($\chi^2$=1.24) is (p>0.05) which is insignificant. Postoperatively hearing gain was (0-5 dB) in 3 patients (20%) with dry ear and 2 patients (13.5%) with wet ear; (6-10 dB), in 4 patients (26.6%) with dry ear and 6 patients (40%) with wet ear; more than 10 dB in5 patients (33.3%) with dry ear and 3 patients (20%) [Table/Fig-1] with wet ear, statistically p-value is $\chi^2$=1.24 (p >0.05) which is not significant.

The successful graft uptake following myringoplasty was seen in 80% in dry ear and 73.3% in wet ear [Table/Fig-2] with no statistical significance ($\chi^2$ =1.24) is (p>0.05) between the two groups in relation to graft uptake.

In dry group, size of the perforation adversely affects the post-operative hearing improvement and graft uptake [Table/Fig-3].

In wet group, size of the perforation was found to be adversely affecting the postoperative hearing improvement but not with respect to graft uptake [Table/Fig-4].

## DISCUSSION

The age of the patient at the time of surgery, the length of time the ear had been dry, nor the presence of the mucopus in the ear at surgery has significant bearing on success [1].

In our study we found that, as the duration of the discharge increases, chances of hearing improvement and graft uptake were less. This association was found when the duration of discharge was more than 5 years in dry ears. In wet ear group, increased chance of graft uptake and improvement in hearing was noticed when the duration of the discharge was less than 5 years. As duration increased, graft failure and no improvement of hearing were observed.

It is observed that the condition of the ear at the time of surgery is not a reliable predictor of subsequent postoperative graft rejection [2]. The patients with wet ear undergoing Myringoplasty showed primary closer of perforation in 84% of the patients and improvement of hearing in 68% of the patients [3].

In our study, pre operative long standing hearing impairment more than 5 years adversely affected the post-operative hearing gain, both in dry ear and wet ear groups. In patients with long standing hearing impairment, probable irreversible damage to the conductive apparatus would contribute to the poor post-operative outcome.

| Hearing gain | Dry ear | % | Wet ear | % |
|---|---|---|---|---|
| No gain | 3 | 20 | 4 | 26.66 |
| <5 dB gain | 3 | 20 | 2 | 13.4 |
| 6-10dB gain | 4 | 26.6 | 6 | 40 |
| >10 dB gain | 5 | 33.3 | 3 | 20 |

**[Table/Fig-1]:** Hearing gain following surgery $\chi^2$= 1.24, p >0.05 NS.

In a study failures occurring in myringoplasties, it is found that there was no significant difference between dry and wet ear in causing re-perforation, but the occurrence of an adhesive ear drum was significantly greater when myringoplasty was performed in a discharging or moist ear rather than in a dry ear [4].

In our study, hearing improvement is noted in 12 patients (80%) in dry ear group, and 11 patients (73.3%) in wet ear. And also, 6 patients (40%) had hearing improvement in the range of 6-10 dB in wet ear, and 5 patients (33.4%) had hearing improvement of more than 10 dB in dry group. However there was no statistical significance ($\chi^2$=1.24 p>0.05) was found on comparing both groups with respect to hearing improvement.

In a study the graft uptake rate of different technique and grafting materials graft uptake rate was found to be 91.4% [5,6]. The condition of middle ear mucosa is not significant in the repair of the tympanic membrane perforation, the closer rate in studied cases is up to 85% [7,8].

In our study, the successful graft uptake following myringoplasty was seen in 80% in dry ear and 73.3% in wet ear with no statistical significance ($\chi^2$ =1.24) is (p>0.05) between the two groups in relation to graft uptake. The most critical point in any myringoplasty is adaptation of anterior margin of graft to the tympanic sulcus. With the underlay technique, after careful scarification of drum lining mucosa, the graft should be placed as far under the anterior annulus as possible and gelfoam used to support graft firmly in position.

In many studies it has been shown that hearing improvement will occur after myringoplasty [9-11]. The graft failure rate is more in totally dry perforation then in wet central perforation mainly because of avascularity of tympanic membrane in a totally dry perforation [12].

In a study among 472 patients in 11 years duration, where it was found that the graft failure rate varies with surgeon's technique [13].

It is found that among different sized or located perforations the condition of middle ear mucosa is not significant in repair of tympanic membrane perforation [14].

| Type of perforation | No. of patients | Average PTA Threshold: Before Surgery | Average PTA Threshold: 3 months after Surgery |
|---|---|---|---|
| Small | 5 | 30.66 db | 26.4 dB |
| Medium | 3 | 54.66 db | 46.33 dB |
| Large | 3 | 51.66 db | 26 dB |
| Subtotal | 4 | 56.4 db | 52.7 dB |

**[Table/Fig-3]:** Hearing improvement in dry ears.

| Type of perforation | No. of patients | Average PTA Threshold: Before Surgery | Average PTA Threshold: 3 months after Surgery |
|---|---|---|---|
| Small | 3 | 31.66 db | 18.66 dB |
| Medium | 8 | 52.32 db | 46 dB |
| Large | 2 | 41.66 db | 40 dB |
| Subtotal | 2 | 53.33 db | 63 dB |

**[Table/Fig-4]:** Hearing improvement in wet ears.

| Status of Middle ear mucosa | Dry ears: No. of Patients | Dry ears: Hearing Improvement: Improved n(%) | Dry ears: Hearing Improvement: Not improved n (%) | Dry ears: Hearing Improvement: Worsened n(%) | Dry ears: Graft Uptake: Graft take n(%) | Dry ears: Graft Uptake: Graft not taken n(%) | Wet ears: No. of Patients | Wet ears: Hearing Improvement: Improved n (%) | Wet ears: Hearing Improvement: Not improved n (%) | Wet ears: Hearing Improvement: Worsened n (%) | Wet ears: Graft Uptake: Graft taken n (%) | Wet ears: Graft Uptake: Graft not taken n (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Congested | - | - | - | - | - | - | 9 | 7 (77.8) | 2 (22.2) | 0 (0) | 7 (77.8) | 2 (22.2) |
| Congested and oedematous | - | - | - | - | - | - | 3 | 1 (33.3) | 2 (66.7) | 0 (0) | 1 (33.3) | 2 (66.7) |
| Not applicable in small perforations | 5 | 5 (100) | 0 | 0 | 5 (100) | 0 | 3 | 3 (100) | 0 (0) | 0 (0) | 3 (100) | 0 (0) |
| Normal | 6 | 5 (83.3) | 1 (16.7) | 0 (00) | 5 (83.3) | 1 (16.7) | - | - | - | - | - | - |
| Pale | 4 | 2 (50) | 2 (50) | 0 (0) | 2 (50) | 2 (50) | - | - | - | - | - | - |

**[Table/Fig-2]:** Status of middle ear mucosa.

| Margin of perforation | Dry ears | | | | | | Wet ears | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No of patients | Hearing Improvement | | | Graft Uptake | | No. of Patients | Hearing Improvement | | | Graft Uptake | |
| | | Improved n (%) | Not mproved n (%) | Worsened n (%) | Graft taken n (%) | Graft not taken n (%) | | Improved n (%) | Not improved n (%) | Worsened n (%) | Graft taken n (%) | Graft not taken n (%) |
| Congested | 0 | - | - | - | - | - | 8 | 6 (75) | 2 (25) | 0 (00) | 6 (75) | 2 (25) |
| Congested and oedematous | 0 | - | - | - | - | - | 7 | 5 (71.4) | 2 (28.6) | 0 (00) | 5 (71.4) | 2 (28.6) |
| Dry | 9 | 8 (88.9) | 1 (11.1) | 0 (00) | 8 (88.9) | 1 (11.1) | 0 | - | - | - | - | - |
| Thinned out | 6 | 4 (66.7) | 2 (33.3) | 0 (00) | 4 (66.7) | 2 (33.3) | 0 | - | - | - | - | - |
| | $\chi^2$=1.11,P>0.05, NS | | | | $\chi^2$=1.11,NS | | | $\chi^2$=0.02, NS | | | No difference | |

**[Table/Fig-5]:** Surgical outcome in relation to margin of perforation.

In dry group, size of the perforation adversely affects the postoperative hearing improvement and graft uptake. This can be attributed to thin nature of the remnant tympanic membrane and reduced vascularity to the margins of perforation. In wet group, size of the perforation was found to be adversely affecting the postoperative hearing improvement but not with respect to graft uptake. This can be attributed to thick residual tympanic membrane and increased vascularity of the inflamed tympanic membrane.

It is found that dry and wet ear can give equal results on removal of the necrotic margins of the remnant tympanic membrane and anterior tucking of the graft [15].

In our study, in dry ear group hearing improvement and graft uptake rate 66.7% cases with thinned out margin when compared to 88.9% in cases with dry margin of perforation, but in wet group, hearing improvement and graft uptake rate were found almost similar in cases with congested margin and in cases with congested and oedematous margin of perforation [Table/Fig-5].

There is no significant difference in the surgical out come in myringoplasty between dry and wet ears [16]. A ten years myringoplasty series by Westerberg J et al., found that there is no association between the cause of perforation and the graft uptake [17].

The state of inflammation of the middle ear had no effect on the surgical outcome in myringoplasty [18] and the state of otorrohea also has no effect on surgical outcome [2].

In our study in dry group, hearing improvement was observed in 5 patients (83.3%) with normal middle ear mucosa when compared to 2 patients (50%) with pale mucosa. Graft uptake was successful in 5 patients (83.3%) with normal middle ear mucosa and 2 patients (50%) with pale mucosa. In wet group, hearing improvement was observed in 7 patients (77.8%) with congested middle ear mucosa and 1 patient (33.3%) in congested and oedematous mucosa. Graft uptake was successful in 7 patients (77.8%) with congested middle ear mucosa and 1 patient (33.3%) in congested and oedematous mucosa.

The main complications of the underlay technique myringoplasty are, reperforation due to failure of graft uptake mainly attributed to the poor vascularity especially in subtotal and large central perforation states. This was observed even in our study.

The main advantage of our study is that the study is focused only on the chronic otitis media of mucosal type including almost factors influencing the surgical outcome together.

## CONCLUSION

The success rate of graft uptake in dry and wet ears and the postoperative hearing improvement in dry and wet ears in our study is statistically not significant and it shows that the presence of discharge in the ear at the time of operation does not interfere with the result of myringoplasty. However, further studies with larger sample size is needed.

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